CLAIMS

1. A method for selecting one or more Diversity Handover, DHO, nodes, such as a Node B or a Radio Network Controller, RNC, executing a macro diversity functionality, in a mobile telecommunication network wherein the macro diversity functionality is distributed to one or a plurality of DHO nodes such as a RNC and its connected Node B(s) in said network, the method is **characterised by** the steps of:

   a.-obtaining topology information comprising a hop-by-hop route from the RNC to each of its connected Node Bs and at least one metric for each hop in the route, and

   b.-using an algorithm for selecting one or more DHO node(s), whereby the algorithm comprises the steps of:

      -forming a macro diversity tree of the routes by means of the obtained topology information, and

      -selecting the Node B(s) and/or the RNC and/or other DHO enabled node(s), that result in the best accumulated metric for all potential data flows between the RNC and its connected Node B(s) in the macro diversity tree of routes, as the DHO node(s).

2. The method according to claim 1, wherein the topology information further comprises for each non-DHO enabled node in the topology information an indication of the closest DHO enabled node.

3. The method according to any of claims 1-2, wherein the forming-step comprises the further steps of:

   -identifying branching nodes in said tree of routes, and

   -identifying the relative interconnections of said branching nodes and the connections to Node Bs and the RNC of said branching nodes.

4. The method according to any of claims 1-3, wherein the at least one metric comprises a delay metric and a generic cost metric and that the step of selecting the DHO Node(s) with the best accumulated metric comprises the steps of:

-selecting the DHO node(s) resulting in the smallest accumulated cost for all potential data flows between the RNC and its connected Node B(s) in the macro diversity tree, as the DHO node(s),

if the accumulated cost is substantially the same for two potential DHO nodes,

selecting as the DHO node the potential DHO node that results in the smallest accumulated delay metric for all potential data flows between the RNC and its connected Node B(s) in the macro diversity tree.

5. The method according to any of claims 1-3, wherein the at least one metric comprises a generic cost.

6. The method according to any of claims 1-3, wherein the at least one metric comprises a delay metric.

7. The method according to any of claims 1-4 or 6, wherein the method comprises the further steps of:

c. –checking that a maximum allowed delay is not exceeded for a data path for each of the selected one or more DHO node(s) by using the delay metric from the topology information, and

if the maximum allowed delay is exceeded,

-performing a delay reduction procedure until the maximum allowed delay is not exceeded.

8. The method according to claim 7, wherein the method comprises the further step of:

-combining the delay metric with node synchronisation measurement in order to determine if the maximum delay is exceeded.

9. The method according to any of claims 7-8, wherein the delay reduction procedure comprises the step of:

-removing already selected macro diversity enabled nodes.

10. The method according to any of methods 1-2, wherein the at least one metric comprises a delay metric and a generic cost metric and the step of selecting the DHO Node(s) with the best accumulated metric comprises the further steps of:

- tentatively selecting a DHO node,
- checking whether the delay of a potential data flow between the RNC and one of its connected Node Bs would exceed a maximum allowed delay if it were to traverse the tentatively selected DHO node, and

selecting the tentatively selected DHO node as a DHO node for said potential data flow if said maximum allowed delay is not exceeded.

11. The method according to any of claims 1-10, wherein the topology information is obtained through manual or semi-automatic management operations in the RNC.

12. The method according to any of claims 1-10, wherein the topology information is obtained via a link state routing protocol used in the transport network.

13. The method according to any of claims 1-10, wherein the topology information is obtained by using a traceroute mechanism that allows the RNC to discover the hop-by-hop route to each Node B.

14. The method according to any of claims 1-10, wherein the topology information is obtained by retrieving the topology information from a RNC in the network.

15. The method according to any of the previous claims, wherein the method comprises the further steps of:

-preparing a DHO related signalling message to be conveyed to a DHO tree node that is a node that is or is planned to be a part of a macro diversity tree,

-including in the signaling message one or more transport layer addresses and one or more transport bearer reference parameters in order to direct one or more inter-DHO tree node data flows of the macro diversity tree, and

-sending said signaling message to said DHO tree node in order to provide DHO related instructions to said DHO tree node.

16. The method according to claim 15, wherein the including-step comprises the further step of:

-replacing the transport layer address and transport bearer reference parameter of an RNC by the transport layer address and transport bearer reference parameter of a DHO tree node that is hierarchically higher than said DHO tree node in a regular signaling message sent to said DHO tree node in order to direct a data flow between said DHO tree node and said higher DHO tree node in the DHO tree node hierarchy.

17. The method according to any of claims 15-16, wherein the including-step comprises the further step of:

-including one or more transport layer addresses and one or more transport bearer reference parameters of one or more DHO tree node(s) that are hierarchically lower than said DHO tree node in a signalling message sent to said DHO tree node in order to direct one or more data flows between said DHO tree node and said one or more lower DHO tree node(s) in the DHO node hierarchy.

18. The method according to any of the claims 15-17, wherein said transport layer addresses are IP addresses and said transport bearer reference parameters are UDP ports.

19. The method according to any of the claims 15-17, wherein said transport layer addresses are ATM addresses and said transport bearer reference parameters are SUGR parameters.

20. The method according to any of claims 15-19, further comprising the step of:

-including in the signaling message Quality of Service (QoS) indications for the data flow(s) to be directed.

21. The method according to any of claims 15-20, further comprising the step of:

-including timing parameters in the signaling message to be used in the uplink combining procedure in the DHO tree node receiving said signaling message.

22. The method according to any of claims 15-21, further comprising the step of:

-including a time indication in the signaling message indicating when the DHO related instructions in the signalling message are to be effectuated in the DHO tree node receiving said signaling message.

23. The method according to claim 22, wherein said time indication is a connection frame number, CFN, pertaining to a Dedicated Channel Frame Protocol, DCH FP, in a UMTS Terrestrial Radio Access Network, UTRAN.

24. The method according to any of claims 15-23, wherein said signaling message is sent from a RNC.

25. The method according to claim 24, wherein said signaling message is a Node B Application Part, NBAP, message.

26. A computer program product directly loadable into the internal memory of a computer within a Radio Network Controller and/or a Node B in a mobile telecommunication network, comprising the software code portions for performing the steps of any of claims 1-25.

27. A computer program product stored on a computer usable medium, comprising a readable program for causing a computer, within a Radio Network Controller and/or a Node B in a mobile telecommunication network, to control an execution of the steps of any of the claims 1-25.

28. A Radio Network Controller, RNC, adapted for selecting a DHO node, e.g. a Node B or a RNC executing a macro diversity functionality in a mobile telecommunication system, wherein the macro diversity functionality is distributed to one or a plurality of DHO nodes such as a Radio Network Controller, RNC, and its connected Node Bs in said network, the RNC is **characterised in** that it comprises:

means for obtaining topology information comprising a hop-by-hop route from the RNC to each of its connected Node Bs and at least one metric for each hop in the route, and

means for using an algorithm for selecting one or more DHO node(s), whereby said means comprises further:

means for forming a macro diversity tree of the routes by means of the obtained topology information, and

means for selecting the Node B(s) and/or the RNC and/or other DHO enabled node(s), that result in the best accumulated metric for all potential data flows between the RNC and its connected Node B(s) in the macro diversity tree of routes, as the DHO node(s).

29. The RNC according to claim 28, wherein the topology information further comprises for each non-DHO enabled node in the topology information an indication of the closest DHO enabled node.

30. The RNC according to any of claims 28-29, wherein the means for forming a macro diversity tree further comprises means for:

-identifying branching nodes in said tree of routes, and means for

-identifying the relative interconnections of said branching nodes and the connections to Node Bs and the RNC of said branching nodes.

31. The RNC according to any of claims 28-30, wherein the at least one metric comprises a delay metric and a generic cost metric and that the means for selecting the DHO Node(s) with the best accumulated metric comprises means for:

-selecting the DHO node(s) resulting in the smallest accumulated cost for all potential data flows between the RNC and its connected Node B(s) in the macro diversity tree, as the DHO node(s),

if the accumulated cost is substantially the same for two potential DHO nodes,

means for selecting as the DHO node the potential DHO node that results in the smallest accumulated delay metric for all potential data flows between the RNC and its connected Node B(s) in the macro diversity tree.

32. The RNC according to any of claims 28-30, wherein the at least one metric comprises a generic cost.

33. The RNC according to any of claims 28-30, wherein the at least one metric comprises a delay metric.

34. The RNC according to any of claims 28-31 or 33, wherein the RNC comprises the further means for:

c. –checking that a maximum allowed delay is not exceeded for a data path for each of the selected one or more DHO node(s) by using the delay metric from the topology information, and

if the maximum allowed delay is exceeded,

-means for performing a delay reduction procedure until the maximum allowed delay is not exceeded.

35. The RNC according to claim 34, wherein the RNC comprises the further means for combining the delay metric with node synchronisation measurement in order to determine if the maximum delay is exceeded.

36. The RNC according to any of claims 34-35, wherein the means for performing a delay reduction procedure comprises means for removing already selected macro diversity enabled nodes.

37. The RNC according to any of methods 28-29, wherein the at least one metric comprises a delay metric and a generic cost metric and the means

for selecting the DHO Node(s) with the best accumulated metric comprises the further means for

- tentatively selecting a DHO node,
- checking whether the delay of a potential data flow between the RNC and one of its connected Node Bs would exceed a maximum allowed delay if it were to traverse the tentatively selected DHO node, and means for

selecting the tentatively selected DHO node as a DHO node for said potential data flow if said maximum allowed delay is not exceeded.

38. The RNC according to any of claims 28-37, wherein the topology information is obtained through manual or semi-automatic management operations in the RNC.

39. The RNC according to any of claims 28-37, wherein the topology information is obtained via a link state routing protocol used in the transport network.

40. The RNC according to any of claims 28-37, wherein the topology information is obtained by using a traceroute mechanism that allows the RNC to discover the hop-by-hop route to each Node B.

41. The RNC according to any of claims 28-37, wherein the topology information is obtained by retrieving the topology information from a RNC in the network.

42. The RNC according to any of the previous claims 28-41, wherein the RNC comprises the further means for:

-preparing a DHO related signalling message to be conveyed to a DHO tree Node that is a node that is or is planned to be a part of a macro diversity tree.

-including in the signaling message one or more transport layer addresses and one or more transport bearer reference parameters in order to direct one or more inter-DHO tree node data flows of the macro diversity tree, and means for

-sending said signaling message to said DHO tree Node in order to provide DHO related instructions to said DHO tree node.

43. The RNC according to claim 42, wherein the means for including comprises the further means for replacing the transport layer address and transport bearer reference parameter of an RNC by the transport layer address and transport bearer reference parameter of a DHO tree node that is hierarchically higher than said DHO tree node in a regular signaling message sent to said DHO tree node in order to direct a data flow between said DHO tree node and said higher DHO tree node in the DHO tree node hierarchy

44. The RNC according to any of claims 42-43, wherein the means for including comprises the further means for including one or more transport layer addresses and one or more transport bearer reference parameters of one or more DHO tree node(s) that are hierarchically lower than said DHO tree node in a signalling message sent to said DHO tree node in order to direct one or more data flows between said first DHO tree node and said one or more lower DHO tree node(s) in the DHO tree node hierarchy.

45. The RNC according to any of the claims 42-44, wherein said transport layer addresses are IP addresses and said transport bearer reference parameters are UDP ports.

46. The RNC according to any of the claims 42-44, wherein said transport layer addresses are ATM addresses and said transport bearer reference parameters are SUGR parameters.

47. The RNC according to any of claims 42-46, further comprises means for including in the signaling message Quality of Service (QoS) indications for the data flow(s) to be directed.

48. The RNC according to any of claims 42-47, further comprises means for including timing parameters in the signaling message to be used in the uplink combining procedure in the DHO tree node receiving said signaling message.

49. The RNC according to any of claims 42-48, further comprises means for-including a time indication in the signaling message indicating when the DHO related instructions in the signalling message are to be effectuated in the DHO tree node receiving said signaling message.

50. The RNC according to claim 49, wherein said time indication is a connection frame number, CFN, pertaining to a Dedicated Channel Frame Protocol, DCH FP, in a UMTS Terrestrial Radio Access Network, UTRAN.

51. The RNC according to any of claims 42-50, wherein said signaling message is a Node B Application Part, NBAP, message.